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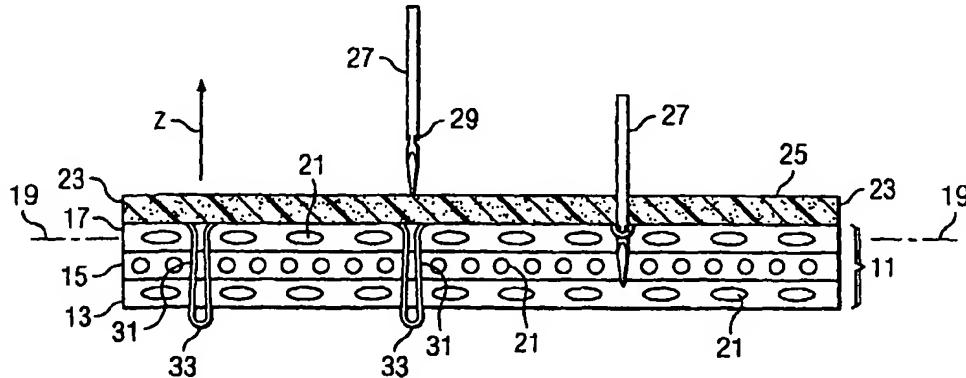
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(54) Title: **METHOD AND APPARATUS FOR Z-DIRECTION REINFORCEMENT OF COMPOSITE LAMINATES**



WO 2004/041528 A3

(57) Abstract: A method and apparatus for Z-direction reinforcement of composite laminates is disclosed. Discrete fibers (25) are pulled through a fiber composite preform (11) in the Z-direction by needles (27) having bars (29) thereon to insert the Z-direction reinforcement (31) into the composite preform (11) from a discrete fiber mat (23) having discrete fibers (25) therein.